



Products From Corn

CORN STARCH

CORN SYRUP

CORN SUGAR

CORN DEXTRINES

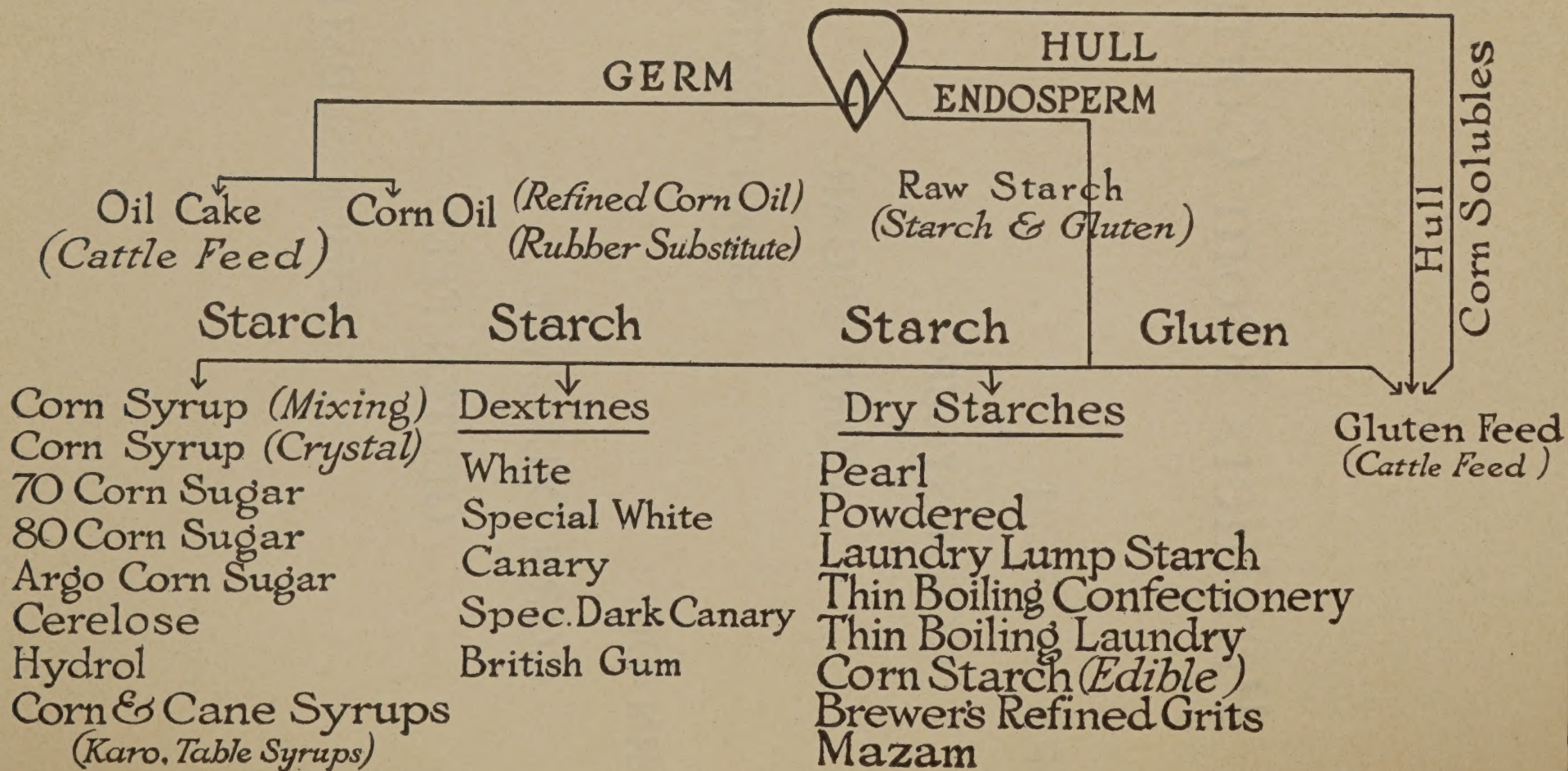
CORN OIL

CORN OIL CAKE

GLUTEN FEED

RUBBER SUBSTITUTE

PRODUCTS MADE FROM THE KERNEL OF CORN



Process of the Manufacture of Corn Products

The following is a short description of the methods employed by the Corn Products Refining Company to effect the separation of the corn kernel into its component parts, whereby the various commercial products are obtained; a list of these products and their uses, followed by a few statistics and references as to the healthfulness of Corn Syrup:

<i>Parts of Corn Kernel</i>	<i>Composition</i>	<i>Products</i>
1—GERM	Oil and Oil Cake	{ Corn Oil, Corn Oil Cake, Corn Oil Meal.
2—ENDOSPERM (Body of the Corn)	{ Starch Gluten	{ Dry Starches, Dextrines, and, by conversion, Corn Syrups and Sugars.
3—HULL	Bran	{ Gluten Feed.
4—WATER ADDED FOR STEEPING	{ Soluble Substances of Corn	

The first step in the process is to steep the corn; the grain absorbs the water and there results a loosening and softening of the various component parts.

The steepwater, containing the solubles of the corn, is drawn off and subsequently evaporated and incorporated with the gluten feed.

The steeped corn is then ground coarsely so that the germ is not broken, and the resulting mass is submitted to a process whereby, by taking advantage of the difference in the specific gravity of the component parts, a separation into germs, hulls, and endosperm is effected.

The germs are dried and from them is produced Oil and Oil Cake.

The hulls are likewise separated and mixed with the gluten and corn solubles to form Gluten Feed.

The endosperm, which is mixed with water, is separated into its component parts (starch and gluten) by processes dependent on the different specific gravities.

The gluten is mixed with the hulls and the corn solubles, which, after drying and grinding, constitute Gluten Feed.

From the starch are produced the three following classes of products:

1. The Dry Starches of various qualities.
2. Corn Syrups and Sugars. These products are obtained by the hydrolization of starch and by subsequent refining and evaporation.
3. The Dextrines. These are produced from starch by a process of roasting.

PROCESS, PRODUCTS AND USES.

CORN OIL.

Corn Oil, Refined Corn Oil, Paragol (rubber substitute.)

PROCESS OF MANUFACTURE OF CORN OIL.

The germs, which contain the oil, after separation from the remaining portion of the corn are dried, ground and subjected to hydraulic pressure whereby the oil is extracted. It is afterwards cleared of foots by filtering and settling.

USES OF CORN OIL.

For the manufacturing of soap, soft soap, and soap powders. For oilcloth, leather, paragol or rubber substitute.

REFINED CORN OIL.

Corn Oil is further refined by a treatment which removes the free fatty acids, etc., improves the taste, and lightens the color.

USES OF REFINED OIL.

For edible purposes, shortening for bread and cake. For frying and cooking and salad oil.

For pharmaceutical purposes, such as ammonia, liniments, camphorated oil, etc.

PARAGOL. (Rubber Substitute.)

This is manufactured from Corn Oil by a vulcanizing process. It is used extensively as a substitute for the more expensive rubber

in the manufacture of various articles such as shoes, rubber specialties, automobile tires, etc., as well as for an insulating material.

CORN OIL CAKE.

The part of the germ from which the oil has been extracted is in the shape of a cake and is called Corn Oil Cake. It is mostly exported in this form. Some is ground and sold as Corn Oil Cake Meal.

USES OF CORN OIL CAKE.

In the cake or ground form, for cattle feed. Mixed with phosphates, as "Hog Meal."

GLUTEN FEED.

Gluten feed is the portion of the kernel of corn that remains after the separation of most of the starch and germ by means of the mechanical processes employed in the starch and glucose manufacture. It is a valuable, concentrated cattle feed with a guaranteed protein content of 23% and 3% oil, together with the valuable soluble inorganic ingredients of the corn.

Gluten Meal is the portion of the kernel of corn that remains after the separation of most of the starch, hull and germ, by means of the mechanical processes employed in the starch and glucose manufacture. It contains about 50% protein.

DRY STARCHES.

Pearl,
Powdered,
Laundry Lump Starch,
Thin Boiling Confectionery,
Thin Boiling Laundry,
Corn Starch (edible),
Brewers' Refined Grits.
Mazam.

PROCESS OF MANUFACTURE OF STARCHES.

The Starch separated from the gluten is removed and transformed into the classes as above described. A portion is directly dried; another is further refined by mixing with water and reprocessed; another portion is treated with a weak alkali and a subsequent washing with large quantities of water whereby a somewhat

purier material is obtained; another portion is modified by a small amount of acid which is neutralized. This changes the starch into the thin boiling and soluble varieties that give on boiling a more liquid paste.

The physical forms of these various classes of starches are obtained by different methods of drying, by which it is possible to produce pearl, crystal or lump:

USES OF THE VARIOUS STARCHES.

For foods, jellies and puddings, for bakers. For baking-powder, pie-filling, pastes and sauces. For candies, gum-drops, lozenges, moulding, etc. In brewing beers, ales. For laundry purposes. For sizes for stiffening and finishing of warp and cop yarns and fabrics. For cosmetics, asbestos, soaps and adhesives. In the manufacture of coal briquettes, etc.

DEXTRINE.

White Dextrine.

Special White Dextrine.

Canary Dextrine.

Special Dark Canary Dextrine.

British Gum.

PROCESS OF MANUFACTURE OF DEXTRINE.

Dextrines are made by roasting the starch, the varieties depending upon the time of operation.

USES OF DEXTRINES.

In the textile industry dextrines are used in sizes for strengthening the fibre and finishing the fabric. For cloth, carpets, twine, etc.

For thickening colors, for calico and other printing. For leather dressings, pastes, food sauces, paper. For gums and glues, ink, mucilages and adhesives. In the fireworks called "sparkler," coffee and rice polishing.

CORN SYRUP.

2	M	(Mixing)	Corn Syrup.
3	A	(Crystal)	" "
4	A	"	" "
5	A	"	" "

PROCESS OF THE MANUFACTURE OF CORN SYRUP.

The Starch is mixed with water and digested under heat and pressure with a minute quantity of hydrochloric acid, $\frac{1}{3}$ as much as is found in the gastric juice. The starch is thereby hydrolized into a liquid, the solids of which are composed of about half dextrine and half of the sugar, glucose. The acid is neutralized by carbonate of soda and forms harmless sodium chloride (table salt). It is then filtered to remove small amounts of the fat and protein occuring in the starch, and decolorized by passing through boneblack similarly as cane sugar is treated in cane sugar refining, is then evaporated to various degrees of concentration from 42° to 45° Baumé.

THE USE OF CORN SYRUP.

There is a universal demand made by the human appetite for some sweetening adjunct to food. Corn Syrup is not as sweet as cane sugar and for this reason is often preferred in various manufactured sweets by many who do not relish the intense and cloying sweetness of the latter. It is, moreover, equally digestible, nutritious and wholesome and has one important advantage over cane sugar that it gives the product a soft, fresh keeping quality, which cane sugar does not.

FOR TABLE SYRUP.

The largest use for Corn Syrup is in table syrups (Karo, etc.), which are mixtures of Corn Syrup and Cane Sugar Syrup or refinery syrup. Corn Syrup, though equally nutritious is not as sweet as Cane Sugar. It is sweet enough, however, for the American public who, last year, consumed in the shape of table syrups 280,000,000 lbs. of Corn Syrup mixed with only 70,000,000 lbs. of Cane Syrup.

CONFECTIONERY.

When candy is made from cane sugar alone, there is frequently great difficulty in preventing graining and in keeping it soft and of the proper consistency. To accomplish this purpose cream of tartar or tartaric acid was formerly employed.

By the use of Corn Syrup, however, it is possible without the addition of anything else to prevent granulation and keep the candy soft and fresh. For this reason it will be seen that apart from its lower cost as compared to cane sugar, the wholesomeness and nutritive value being the same, Corn Syrup is peculiarly valu-

able in candy making. Bear this in mind, that Corn Syrup not only puts wholesome, nutritious, sanitarily prepared candy within the reach of the poorest, but also is almost universally employed in the manufacture of the more expensive grades. Last year it was estimated that of the 800,000,000 lbs. of candy consumed 200,000,000 lbs. was Corn Syrup.

JAMS, JELLIES AND PRESERVES.

In Jams, Jellies and Preserves, and other healthful and appetizing sweet, inexpensive desserts, which are a boon to the general public, Corn Syrup is used.

FOR TECHNICAL PURPOSES.

Corn Syrup is likewise employed for numberless technical purposes. For baking, syrups, mince-meat and other desserts, Brewing of beers, chewing tobacco, food sauces, canning of meats, pastes and sizes, tanning of leather, blacking, printers' rollers, shoe polishes, for finishing moulds and cores in iron foundries, in extracts, such as logwood, etc., in silvering glass for mirrors, in liquid soaps, hair tonics, sponges, coffee and rice polishing.

SUGARS.

70 Corn Sugar.

80 Corn Sugar.

Argo Corn Sugar.

Cerelose.

Hydrol.

PROCESS OF THE MANUFACTURE OF CORN SUGAR.

The starch is hydrolized just as in the manufacture of corn syrup except that for 70 Sugar the operation is continued until the dry substance in the liquid consists of 86 parts of glucose and 14 parts of dextrine; and for 80 Sugar, of 92 parts of glucose and 8 parts of dextrine. The liquors are subsequently refined and concentrated, but the end result instead of being a syrup (which will retain its consistency) crystallizes or hardens into a sugar after it has been run into barrels or pans. It is removed from the latter and cut up into small pieces for packing in bags.

Bread Sugar and Anhydrous Sugar are prepared by pressing from 70 Sugar the mother liquor, whereby a refined product is produced, the dry substance of which consists of 98% glucose.

USES OF CORN SUGAR.

In the manufacture of caramel or sugar coloring.

In brewing beers, ales, porters, etc.

Vinegars.

In the manufacture of lactic acid for tanning, for filling leather, etc.

STATISTICS.

It was not until after the Civil War that experiments were started in the United States to make syrup from corn starch, the most available source of starch in this country. These experiments were successful and the products called "Grape Sugar" and "Corn Syrup" were made, comparing favorably with the products made from potato starch. The industry grew rapidly until in the year 1884 the importation of potato syrup and of potato sugar or grape sugar fell off to a very small amount, and the exportation of corn products assumed large proportions. Since that time it has grown until it is now one of the most important industries. A few figures will show this conclusively.

During the last year there was used in the manufacture of starch, corn syrup, and sugar 50,000,000 bushels of corn worth over twenty-five million dollars. The corn exported was 83,000,000 bushels. This means that this industry has paid the farmers for one-half as much corn as has been exported. The corn sold from the farm is called "Cash Corn." Of this about 15% is consumed by the starch and corn syrup factories.

ESTIMATE OF TOTAL CORN PRODUCTS MANUFACTURED ANNUALLY IN THE UNITED STATES

Corn manufactured into Corn Products.....	50,000,000 bushels.
Corn Syrup.....	800,000,000 pounds.
Starch	600,000,000 "
Corn Sugar.....	230,000,000 "
Gluten Feed.....	625,000,000 "
Oil	75,000,000 "
Oil Cake.....	90,000,000 "
	2,420,000,000 "

Corn Syrup (flavored with Cane Syrup)..... 350,000,000 pounds
(or about 4 lbs. per capita of the population.)

In the 800,000,000 lbs. of candy consumed in the
United States in 1910, there was used of

Corn Syrup..... 200,000,000 pounds.

Freight (in tons).....	4,000,000
Estimated Total Capital invested.....	\$90,000,000
Coal burnt—1,000 tons—value.....	1,286,000
6,000 employees—annual wages.....	4,500,000
Supplies (boxes, barrels, etc.) over.....	10,000,000

Besides this there must be taken into account the money spent for machinery, etc.

This shows how enormously the industry has been developed and how great an importance it has assumed. Corn is our greatest natural source of wealth, and the manufacture of it into such varied products, adaptable as they are to so many uses as foods and in the arts, make it a national institution which creates the liveliest interest and should have the enthusiastic support of all the community.

VALUE OF CORN SYRUP (GLUCOSE) AS A FOOD.

To clearly understand the value of Corn Syrup (Glucose) as a food, I have prepared a table which illustrates the elementary substances of which all foods are composed, and their particular functions in the work of construction and nutrition of the human or animal body:

1. Protein	produces	HEAT, ENERGY, TISSUE, MUSCLE, and probably fat.
2. Fat	“	HEAT, ENERGY and FAT.
3. Carbohydrates, Sugars, etc.....	“	HEAT, ENERGY and FAT.
4. Mineral Matters..	“	Bone Structure, and the salts of the liquid portion of the body.

The elemental substances of which Corn Syrup (Glucose) is composed belong entirely to the third class, the carbohydrates, which are more largely present than the other classes in all foods, and which produce especially the heat and energy necessary for life, and also to a lesser extent the fat of the body.

The carbohydrates embrace the starches, dextrines, and the various sugars. All these substances must be transformed into Glucose in order to be absorbed in the blood and therein transferred to nourish each portion of the body.

There are a large number of fundamental sugars, the five principal being Saccharose, Glucose, Fructose, Lactose, and Maltose,

These Sugars have certain points of resemblance. They are all sweet, they have a definite though varying crystalline form and they can be distinguished by their reactions with copper solution and their action on polarized light.

It is customary to estimate the value of the different carbohydrates by the calorific power. The results are expressed as calories, showing the amount of heat produced by their oxidation on burning in the human body. The calories of all these substances (sugars, dextrines and starch) is very nearly the same. Those of cane sugar and maltose are somewhat higher than Glucose, it is true, but as the former must be transformed into Glucose before they can enter the circulation, an equivalent of heat units is required for this conversion so that the final calorific value of all the sugars and carbohydrates is practically the same.

The following table illustrates the different fundamental sugars, the commercial and natural saccharine products, and the different combinations of the fundamental sugars in these products:

<i>Fundamental Sugars</i>	<i>Commercial Nomenclature of Products</i>	<i>Composition of the Commercial Product</i>
I. Sucrose } Saccharose } $C_{12}H_{22}O_{11}$	Sugar: Cane or Beet	Saccharose
	Sugar	Saccharose
	Maple Sugar	Saccharose, Fructose and Glucose.
	Maple Syrup	Glucose, Fructose and Saccharose.
	Refinery Syrup	Glucose, Fructose and Saccharose.
	Molasses }	Glucose, Fructose and
	Black Strap }	Saccharose.
	Candies (without Corn Syrup)	Glucose, Saccharose and Fructose.
	Some candies, such as creams, have only a small amount of Glucose and Fructose.	
	Candies (with Corn Syrup)	Glucose, Saccharose, Fructose & Dextrine.
	Jams, Jellies, Preserves, (without Corn Syrup)	Glucose, Saccharose and Fructose.
	Jams, Jellies, Preserves, (with Corn Syrup)	Glucose, Saccharose, Fructose & Dextrine.

2. Glucose or } Dextrose }	$C_6H_{12}O_6$	Grape Sugars in Raisins and other fruits Sap of many trees and plants Juice of many fruits Anhydrous Sugar Corn Syrup (Glucose) Argo Sugar, 70 and 80 Sugar Refinery Syrup } Molasses }	Glucose and Fructose Glucose and Fructose Glucose and Fructose Glucose Glucose and Dextrine Glucose and Dextrine Glucose, Saccharose and Fructose.
3. Fructose } or Levulose }	$C_6H_{12}O_6$	Invert Sugar Honey	Glucose and Fructose Glucose and Fructose
4. Lactose	$C_{12}H_{22}O_{11}$	Milk Sugar	Lactose
5. Maltose	$C_{12}H_{22}O_{11}$	Malt Syrup } Malt Extract }	Maltose, Glucose and Fructose.

It will be noticed that Glucose is found in all but cane sugar or beet sugar, maple sugar, and milk sugar. Even Maltose is changed into Glucose before it can be converted into alcohol in brewing and distilling.

Therefore, of all sugars, Glucose is by far the most universal, for all carbohydrates must become Glucose before they can enter and nourish the plant or animal system. *Without Glucose there would be no human life.*

Among the Commercial products is Corn Syrup (Glucose), which is composed of about one-half Dextrine and one-half of the fundamental sugar, Glucose. It is a sweet, nutritious, easily digestible syrup, having physical properties which make it especially adaptable for candies, jellies and table syrups.

Frequently there have appeared statements in the public press claiming that Corn Syrup (Glucose) is poisonous on account of the sulfuric acid used in its manufacture. Formerly Corn Syrup (Glucose) was made by treating the starch with a small amount of sulphuric acid, which, however, was neutralized with soda and changed into a harmless salt. But for the last thirty years no sulphuric acid has been used in this country.

Again there are critics who claim that Corn Syrup (Glucose) is injurious on account of its containing sulphurous acid. For thirty years before 1907 all Corn Syrup (Glucose) contained about one-tenth of one per cent. of sulphurous acid. This was not added to decolorize the liquor, as decolorization was accomplished by the use of boneblack, which has always been used for this purpose

in the refining of cane sugar. When Corn Syrup is finished and run into barrels it is water white, but it discolors rapidly assuming a decided yellow tint within a few weeks. If one-tenth of one per cent. of sulphurous acid is added, Corn Syrup will keep its color indefinitely.

It was never considered that this small quantity was in any way injurious for it was no larger than is allowed by the Prussian Government in dried fruits, nor than is permitted in England and other European countries in Glucose or other food products. However, we found in 1907 that the laws of Pennsylvania prohibited even this minute amount, and we therefore abandoned its use.

REFERENCES AS TO THE HEALTHFULNESS OF CORN SYRUP (GLUCOSE).

FOREWORD.

The enclosed references will, we believe, prove interesting. A word first as to the use of the term "glucose." The ordinary sugar of commerce is made from sugar cane or beets and is known scientifically as "sucrose." The sugar and syrup made from starch is known scientifically as "glucose." The word "glucose" has both a scientific and a commercial meaning. Scientifically, it refers to one of the groups of sugars having the composition $C_6H_{12}O_6$. Commercially it refers to any sweet syrup made from starch. Since "glucose" used commercially may mean a syrup made from any kind of starch—for example, potato, cassava, arrow-root, sago, corn, wheat, etc., because of the too great comprehensiveness of this term, and also because it has acquired an entirely undeserved odium—the public associating it with "glue" (it being, as a matter of fact, derived from the Greek word "glukos" meaning sweet)—starch syrups and sugars have for some time past been commercially designated by the sources from which they are derived. Thus, as stated in the *Standard Dictionary*:

"Sugar is called according to its source: beet sugar, cane sugar, date sugar, grape sugar, maize sugar, maple sugar, melon sugar, and sorghum sugar."

It is as a result of this unfortunate confusion of scientific and commercial phraseology that the enclosed references use the terms "glucose," "starch sugar," "maize starch sugar," "corn sugar," "grape sugar," etc., indiscriminately to designate the same product. The term Corn Syrup, to designate the syrup made from shelled

corn, has received the official sanction of the United States Government, as is shown in the United States Department of Agriculture Food Inspection Decision No. 87, printed herein in full. It is to be hoped that this official terminology will be adopted everywhere, and that syrups and sugars will universally be known as "cane sugar," "cane syrup," "corn sugar," "corn syrup," "maple sugar," "maple syrup," etc., according to the source from which they are produced.

UNITED STATES DEPARTMENT OF AGRICULTURE

Office of the Secretary
Board of Food and Drug Inspection

FOOD INSPECTION DECISION 87

LABELING OF CORN SYRUP

Washington, D. C., February 13, 1908.

We have each given careful consideration to the labeling, under the pure food law, of the thick, viscous syrup obtained by the incomplete hydrolysis of the starch of corn, and composed essentially of dextrose, maltose, and dextrine.

In our opinion it is lawful to label this syrup as "Corn Syrup"; and if to the corn syrup there is added a small percentage of refiner's syrup, a product of the cane, the mixture, in our judgment, is not misbranded if labeled "Corn Syrup with Cane Flavor."

GEORGE B. CORTELYOU,
Secretary of the Treasury,
JAMES WILSON,
Secretary of Agriculture.
OSCAR S. STRAUS,
Secretary of Commerce and Labor.

In 1883, at the request of Hon. G. B. Raum, Commissioner of Internal Revenue, a committee of the National Academy of Science made a report on glucose. The following are its findings:

1. That the manufacture of sugar from starch is a long established industry, scientifically valuable and commercially important.
2. That the processes which it employs at the present time are unobjectionable in their character, and leave the product uncontaminated.

3. That the starch having at best only about three-fifths of the sweetening power of cane sugar, yet starch sugar is in no way inferior to cane sugar in healthfulness, there being no evidence before the Committee that maize starch sugar, either in its normal condition or fermented, has any deleterious effect upon the system, even when taken in large quantities.

All of which is respectfully submitted.

Prof GEO. F. BARKER, Chairman, University of Penn.

Prof. WILLIAM H. BREWER, University of Yale.

Prof. WOLCOTT GIBBS, Harvard University.

Prof. CHAS. F. CHANDLER, Columbia University.

Prof. IRA REMSEN, Johns Hopkins University.

The following quotations are from letters from each member of the above Committee, reaffirming their opinions after the lapse of ten years.

University of Pennsylvania, Philadelphia, December 12, 1894.

In the ten years and more which have elapsed since the committee made its report, not a single fact has appeared, I believe, tending to invalidate its conclusions in the slightest; and this although the consumption in the material had increased tenfold. I see no reason therefore for modifying the opinion expressed in the report maintaining the desirability and excellence of glucose as an article of food.

(Signed) GEORGE F. BARKER, M. D.

Sheffield Scientific School of Yale University,
New Haven, December 13, 1894.

I was then and have been continuously since a member of the Board of Health, and have watched the subject on both its sanitary and economic effects, and my opinion as to its wholesomeness is the same I then proved, and I am even more impressed with its economic importance to the country than I was then.

(Signed) WM. H. BREWER, M. D., Ph. D.

Newport, R. I., December 14, 1894.

Since that report was presented to the Academy and by the President of the Academy to the Commissioner of Internal Revenue, no facts of any kind tending even to show that Glucose made of corn starch is any way injurious to health have been brought to the knowledge of chemists. My opinion therefore remains unchanged.

(Signed) WOLCOTT GIBBS, M. D., LL. D.

School of Mines, Columbia Univ., New York, November 30, 1894.

I have not been able to learn anything which would lead me to modify the opinion we then expressed in that report with regard to the healthfulness and value as an article of food of glucose.

(Signed) C. F. CHANDLER, Ph. D., M. D.

Johns Hopkins University, Baltimore, Md., December 12, 1894.

Since the date of the report, I have not learned of anything that has caused me to change my opinion on the subject.

(Signed) IRA REMSEN, M. D., Ph. D.

Johns Hopkins University, Chemical Laboratory,
Baltimore, Md., April 4, 1898.

C. H. MATHIESSEN, Esq., President of the Glucose Refining Co.,
The Rookery, Chicago, Ill.

Dear Sir:

I have received your letter of April 1st, in reply to the one I sent to Mr. Ulysses S. Glick. I have now read over part of the report which the Committee of the National Academy of Sciences made to the Government of the United States some years ago, and I see no reason for changing the opinion expressed in that report. The experiments on the effects of glucose in the animal system were performed in this laboratory under my personal supervision, and as stated in the report, the conclusion was reached that the substance glucose was not harmful. I do not see how the experiments could be more thorough, more convincing, than those experiments were. Certainly no experiments have been made since that time that tend in the least to invalidate our results, and I therefore again say without hesitation that in my opinion the products known as glucose and grape sugar, as found in the market, are pure and healthful, and legislation against these products is not called for in the interest of the community. I am,

Yours respectfully,
(Signed) IRA REMSEN, M. D., Ph. D.

Columbia University, Department of Chemistry, Havemeyer Hall,
116th Street and Amsterdam Avenue, New York, April 11, 1898.

THOMAS GAUNT, Esq., General Manager,
Glucose Refining Co., Chicago, Ill.

My dear Sir:

In reply to your favor asking me if I have seen any reason to change the opinion I expressed many years ago as a member of the Special Committee of the National Academy of Sciences, appointed at the request of the Treasury Department to investigate the subject of Glucose or Grape Sugar, I would say that, although I have kept myself informed upon this subject, nothing has occurred and no facts—chemical, physiological, or sanitary—have been published which in any way indicate that the opinion arrived at by our Committee was not absolutely correct.

I would say further that the same statement applies to starch, whether made from corn or made from wheat. The old story alleging that Glucose or Grape Sugar is unwholesome because "deadly acids" are employed in its preparation is simply ridiculous. I have never known of any reputable chemist finding any such acids in either Glucose or Grape Sugar.

In conclusion I would say that in my opinion there are no articles of food to be found in commerce that are less liable to suspicion than the Glucose or Grape Sugar manufactured and sold in the United States.

Very respectfully yours,
(Signed) C. F. CHANDLER, Ph. D., M. D.

From an address delivered at a meeting of the Philadelphia Retail Grocers' Association, February 15th, 1905, by Dr. H. W. Wiley, Chief, Division of Chemistry, U. S. Department of Agriculture, Washington:

"I am a friend of glucose."

From Report 516, 56th Congress, 1st Session, 1899-1900, by Dr. H. W. Wiley, Chief, Division of Chemistry, U. S. Department of Agriculture, Washington, D. C.

"I have had occasion to make careful examination of almost every variety of food that has ever been exposed upon our markets for sale. In my opinion glucose is not deleterious to health. It is wholesome, somewhat sweet, easily digestible. I have always found, from the time I first began to investigate food products, that the series of foods known as glucose or grape sugar, when properly made, are valuable food materials and not injurious."

Page 31.—"The starch, the glucose, the sugar, the flour, the chocolate, the burnt sugar, and the gelatines which are used in confections, are certainly not to be condemned."

Page 30.—"A confection like the marshmallow would naturally contain glucose."

From *Foods and Their Adulteration*, 1907, by Dr. H. W. Wiley, Chief, Division of Chemistry, U. S. Department of Agriculture, Washington, D. C.

Page 384.—"Pure glucose, being simply a hydrolized production of starch, cannot be regarded as a substance injurious to health."

Page 384.—"In the present stage of our knowledge, glucose is not regarded by the majority of hygienists as a substance injurious to health."

Page 482.—"The saccharine materials, which are employed in the preparation of confectionery, are sugars of the various kinds, namely, maple, cane, and beet sugar, together with glucose, dextrose, and invert sugar."

Page 483.—"The food value of confectionery or candy is not as a rule considered, since it is eaten more for its flavor and general palatability and attractiveness than for its nutritive properties. Nevertheless the food value of candy is often very high, and is measured chiefly by the sugars it contains."

(Glucose is a sugar.)

From Bulletin No. 59, Bureau of Forestry, U. S. Department of Agriculture, 1905, by Dr. H. W. Wiley, Chief, Division of Chemistry, Washington, D. C.

Page 49.—"The advantage of using glucose nevertheless is very great, aside from its cheapness.... A molasses or syrup, therefore, made chiefly of glucose and flavored with the genuine product, makes a very attractive article for table use, in so far as appearance goes. Neither in regard to wholesomeness is it advisable to condemn glucose. When properly made it is apparently as wholesome an article of diet as cane sugar. In fact, the starches which are consumed in our foods are all converted into glucose during the process of digestion. A glucose food, therefore, is a starch food already partially digested."

Page 49.—"In this country glucose is made chiefly from Indian Corn, and the high price of this product makes glucose cost almost as much as the other materials of which ordinary molasses and syrups are made."

Dr. H. W. Wiley wrote an article on "Glucose" in the *Popular Science Monthly* of 1881. The following are excerpts from his article:

Page 256.—"The question of most practical importance is, 'Is Glucose a wholesome article of food?' I do not hesitate to answer this question in the affirmative."

Page 257.—"There is no reason to believe that a glucose or grape sugar properly manufactured is any less wholesome than cane sugar or maple sugar. Corn, the new American King, now supplies us with bread, meat and sugar which we need, as well as with whiskey which we can do without."

In an article on "Mixed Sugars" in the *American Association for the Advancement of Science*, 1881, Dr. H. W. Wiley wrote the following:

Page 64.—"It is important that the public be not defrauded by purchasing sugars under false names. It is true that the manufacturers, as far as I know, do not sell the mixed sugars as straight, but when they pass into the hands of the retail dealers, they are usually disposed of as if they were genuine. I do not anticipate that mixed sugars will jeopardize the public health. When well made they are certainly palatable and harmless. For boiling with fruits, etc., as in making preserves, they are quite as efficient as cane sugars. Nevertheless a 'mixed sugar' should be bought, sold, and consumed as a mixed sugar and thus all 'winking' at fraud be prevented."

In the Report of the Chemist of the Department of Agriculture, 1881-82, we find in an article entitled *Available Sugar in Juice of Maize* the following:

"There seems to be no reason why.... both glucose syrup and grape sugar should not be perfectly healthy articles of diet."

From Bulletin No. 25 (1890), Division of Chemistry, U. S. Department of Agriculture, we quote the following statement of Dr. Beckwith's:

Page 52.—"*Per se* glucose is wholesome and nutritious; its production encourages corn growing, increases the sugar supply, and offers employment to capital and labor."

From *Standards of Purity for Food Products*, Circular No. 19, Office of the Secretary, United States Department of Agriculture.

Page 10.—"Candy is a product made from a saccharine substance or substances with or without the addition of harmless coloring flavoring or filling materials, etc."

(Glucose is a saccharine substance.)

From *U. S. Dispensatory* 19th Edition.

"Glucose or grape sugar exceeds cane sugar in food value on account of its being more readily digested."

Dr. Alfred M. Peter of the Agricultural Experiment Station of the State College of Kentucky, in a letter dated February 10th, 1908 states:

"I have always regarded glucose as a wholesome food."

From Farmers' Bulletin No. 93, U. S. Department of Agriculture, an article entitled *Sugar as a Food*, by Mary Hinman Abel (1906) contains the following:

Page 9.—"Although not so sweet as cane sugar, pure glucose is considered to be a perfectly wholesome compound possessed of a definite food value."

Page 9.—"It is agreed that this form of sugar, aside from its cheapness, is much better adapted for certain candymaking processes than the more expensive cane sugar."

Page 10.—"In addition to very small quantities of cane sugar, honey consists of a mixture of glucose and levulose (about 37% of each)."

Page 19.—"The value of glucose as a muscle food has been recently shown by methods similar to Schumberg's."

"Pure glucose is no longer considered an adulterant."

Prof. Wayne, M.D., of Cincinnati, makes the following assertion:

"Glucose is simply a starch changed by chemical agency into a variety of sugar. It is an article that has been long in use in France and Germany, nations famous for the strict scrutiny with which they examine and test all articles sold for food, and they have not discovered the unhealthy character of it and forbidden its sale."

By Senator Mason, Chairman U.S. Committee on Manufactures:

"The evidence is clear that glucose is a healthy product and, when properly made, is as healthy as cane sugar."

From *Food Inspection and Analysis*, 1904, by Albert E. Leach, Chemist of the State Board of Health, Massachusetts:

"The composition of confectionery is more complex than that of the saccharine products hitherto considered. As a rule, cane sugar, or one of its products, as molasses, form the basis of most of the confections. Commercial glucose is also a common ingredient."

"Of late the adulteration of confectionery has been held largely in check by the National Confectioners' Association of the United States, which has fixed high standards of purity. Commercial glucose is not regarded as an adulteration of confectionery by the above named Association."

Statement by John Milton Dodson, A. M., M. D., Professor of Physiology; Arthur Dewes Bevan, Professor of Anatomy; A. C. Cotton, H.M., M.D., Professor of Diseases of Children; Henry Lyman, Professor of Theory and Practice of Medicine, Rush Medical College, University of Chicago:

"There can be no room for doubt as to the absolute wholesomeness and value of glucose, properly manufactured, as an article of food. There is not

a vestige of evidence to show that it is not in every way as healthy, pure, and useful an article of diet as cane sugar."

By A. C. Cotton, M.D., Professor of Children's Diseases, Rush Medical College, University of Chicago:

"I believe glucose to be the best form in which saccharine matter can be introduced into the stomach, on account of its ready absorption and assimilation. The admixture of glucose with any substances should enhance their value as food."

Professor Walter S. Haines, Rush Medical College, University of Chicago, states:

"Glucose is very valuable as a nutritious article of food, and the time should come when it will be used for ordinary purposes instead of sugar."

By Justice Harris of the Supreme Court of Michigan, in *People vs. Harris*:

"We have therefore a valuable and healthful product (glucose) made from two pure, healthful, and valuable ingredients, advertised and placed upon the markets for what it is really, and without deception, fraud, or chance to injure the public in any way."

"Glucose as made from corn and contained in 'Victor Corn Syrup' in question, is entirely harmless and recognized generally by the highest authorities as a valuable food product."

From *Glucose in Confectionery*, a statement from the National Confectioners' Association of the United States, 1898:

"Glucose in confectionery is not a harmful or fraudulent adulterant, but is of benefit to consumers and a commercial necessity to manufacturers."

"Glucose, as a rule, is not substituted for cane sugar in confectionery."

"Glucose, or starch sugar, has certain distinctive and valuable qualities of its own."

"The manufacturer must, as occasion demands, use cane sugar, glucose, or grape sugar."

From *Food Materials and Their Adulterations*, 3rd edition, by Ellen H. Richards, Instructor in Sanitary Chemistry in the Massachusetts Institute of Technology:

"Glucose itself is a good food."

"In jellies and preserved fruits a large portion of the cane sugar, or sucrose, is changed during the heating with the acid juice of the fruit."

"Confectionery is usually preferred in a soft or amorphous condition; rock candy or crystallized sugar is rarely called for. It is for this reason that sugar for making candy is inverted or changed into reducing sugar (mixture of dextrose, grape sugar, and levulose or fruit sugar) by boiling with some acid, usually cream of tartar or tartaric acid. The *fondant* of chocolate creams and bonbons may be made in this way. Gum and starch pastes, even clay, may be used to dilute the crystals of sugar and keep the

mass agreeably soft, but commercial glucose is easier to work, healthful, cheap and pure, therefore, is largely used in modern candy-making."

From *New International Encyclopaedia*, 1903, Volume 8:

"Well made glucose must be regarded as a perfectly wholesome product."

From *The Americana*, Volume 7:

"Glucose is very largely used in the manufacture of confectionery. Some candies are nearly all glucose, particularly such as are sold for a penny. In the high grade confections the finest grade is used, not as a substitute for sugar."

From the New American Supplement to *Encyclopaedia Britannica*, 1897, Volume 3:

"Many experiments were made with reference to the healthfulness of glucose.... In all cases it was found to be harmless and unobjectionable."

From *Commercial Organic Analysis*, 1898, by Alfred H. Allen, past-President of Society of Public Analysts of Great Britain.

"Starch glucose is very extensively employed in the manufacture of confections, but its use seems wholly unobjectionable."

Dr. J. P. Murphy, LL.D., M.D., Professor of Surgery, College of Physicians and Surgeons, Medical Department of Illinois University, writes:

"Starch is absolutely necessary in the animal economy. This starch in the system is converted into glucose. Glucose is absolutely necessary and if it is not admitted into the system as glucose it must be taken in as starch. If we supply the system with glucose direct in jellies, syrups, preserves, etc., we save the digestive tract from the amount of work necessary for its production within the system."

W. J. Butler, M.D., Instructor of Chemistry and Assistant to Clinic Diseases of Children, Rush Medical College, writes:

"We would therefore not only not be justified in offering an objection to glucose as a food during health, but really acknowledge for it a decided efficacy in conditions of deranged digestion, in which the digestion of starch is interfered with, just as we would employ peptonized foods (peptones) in disturbances of the stomach or conditions requiring an avoidance of much waste product."

Dr. Cyrus Edson, Commissioner of Health, State of New York, in a letter dated October 12, 1894, says:

"Starch cannot be used by the human system until after the digestive organs convert it or change it into glucose; consequently, if glucose is condemned as causing diabetes, potatoes and other starchy foods must also be condemned for they must become glucose before they can be assimilated. To eat potatoes is to consume glucose; to eat bread is to consume glucose."

Honey is but another form of glucose. Glucose is the basis of a multitude of infant foods. Malt is practically but another form of glucose. A health officer who condemns glucose cannot consistently fail to condemn bread, potatoes, malt, honey, and most of the infant foods now on the market. This is *reductio ad absurdum*."

"Glucose may justly be called pre-digested starch since, as I have said, it is starch in the exact condition that we find it prepared by the digestive organs for assimilation. Glucose is pre-eminently a fat-forming, heat-producing food. Under a diet of glucose a man can perform more muscular work than under any other single article of food. Glucose not only is not injurious but it is an essential article of food without which, in some form, man cannot enjoy life."

Peter T. Austen, Ph.D., F.C.S., late Professor of Analytical and Applied Chemistry in Rutgers College, and of the New Jersey Scientific School, says:

"The merits of glucose may be briefly summed up as follows: It is one of the most wholesome sugars, far purer in every way than many kinds of molasses, which is really a side-product or residue in the manufacture of cane sugar. Molasses is the liquid from which no more cane sugar can be crystallized, and which contains frequently a large amount of the chemicals added during the manufacture. A large percentage of its saccharine substance is glucose and, in fact, in many cases it could be called an impure glucose.

Secondly: Glucose is the most natural sugar consumed by man, and the evidence of this is that (1) the juices of all sweet fruits contain it, *e. g.*, the grape contains fifteen per cent. of it; (2) and that cane sugar is largely converted into glucose in the system by the secretions of the mouth and the liver before it can be assimilated.

Thirdly: Glucose is entirely absorbed into the system and no part passes from it unchanged.

Fourthly: The testimony of the countries where it has been used for years is in favor of its healthfulness, harmlessness, and purity; and in the nation of the most advanced chemical discoveries it has received the most ample protection and unqualified endorsement."

Page 58.—"Surely no one can say that glucose can have an unwholesome effect on us, when it exists in our most favorite articles of food, and in those in which it does not exist in its pure state, the digestive organs produce it. We see, therefore, that not only is glucose a perfectly harmless food, but it is the most natural food that exists. It is a perfectly wholesome article of food, for, as has been stated, the grape sugar from starch is the same as that existing in nature, in fruit, and is an established article of food.

It would be more interesting to exhibit candies that do *not* contain glucose; for with perhaps the exception of rock candy, which is pure cane sugar, it would be difficult to find many candies that do not contain more or less glucose either made from cane sugar or starch. Here, again, these somewhat premature polemicists stumble over an awkward matter. How will they dispose of *raisins*, which contain nearly 30% of grape sugar, and which are so often found in confections and cake? Would they abolish the use of maple sugar and honey because these consist mainly of glucose?

Still more troublesome does the matter become when preserved fruits are mentioned. The well-known fact that cane sugars break into glucose

and allied sugars when its water solution is boiled with a small amount of acid is a difficult matter to dispose of. The slight amount of acid which is contained in fruit converts the sugars with which they are boiled into glucose and kindred sugars. Are these then also to be condemned because they contain glucose?"

Page 59.—"There is not the slightest foundation for the statement that grape sugar is unhealthy; on the contrary, it is one of the healthiest substances known, and has always been, and always will be one of the chief articles of human food. Every time we eat ripe fruit we eat glucose, precisely the same as made from starch, except that one is made from starch by nature, and the other by human agency. Every time that we eat food containing starch, as potatoes for instance, the digestive organs make grape sugar out of it. In regard to its wholesomeness in beer, *Cooley's Encyclopaedia*, p. 1585, speaking of glucose, says:

'In the brewing of beer and pale and sparkling ales, grape sugar is more esteemed than cane sugar and malt, and it is said yields a more sound and wholesome liquor. One free from the acidity, impurity, and treacly sweetness frequently found in beer brewed from raw and inferior sugars.'

The Journal of the English Patent Office in the Special Department of Sugars, 1871, says, in speaking of glucose:

'Grape sugar, although found in a great number of substances, especially fruits, is not known to exist in any one of them in such quantity as to render its manufacture from fruits of any value, but chemistry has stepped in and supplied this deficiency, and the production of grape sugar or glucose, by action upon starch or such like substances with a dilute acid and heat, has now become a manufacture of some considerable importance, especially on the continent, and this has arisen partly from the fact that this article can be brought into this market, as nearly as may be, colorless and without any flavor but its sweet taste, and these properties make it highly valuable for confectionery purposes, and likewise from the important fact that malt liquors to which a portion of cane sugar has been added do not keep so well as those to which a like portion of grape or glucose sugar has been added; consequently it has now come into considerable favor with a large number of brewers in England who employ a portion of it along with the malt and by so doing are said to obtain from this mixture a malt liquor of a more permanent character than when brewed with malt alone, or a mixture of malt and any cane sugar, however pure the cane sugar may have been.'

Office of the Iowa City Board of Health,
Iowa City, Ia., March 3, 1892.

T. C. CARSON, Esq.,
Iowa City, Ia.

Dear Sir:

In answer to your question if I deemed "glucose" as an article of diet injurious in any way to the animal economy, I answer without hesitation: No! As an article of diet it enters more largely into general use than is

supposed; and I do not believe that it enters as a factor into any disease, directly or indirectly, as the cause of the same.

ENOS F. CLAPP,
Professor of Anatomy,
Medical Dept., S. U. I.

The following extracts are from an article by Dr. Wm. Murrell, Physician to the Westminster Hospital, lecturer on Chemical Medicines, and joint lecturer on the principles and practice of medicine, Examiner in the University of Glasgow, that appeared in the *Medical Press and Circular*, May 1st, 1901, from a reprint of the same:

Page 3.—“Although in the original hearing it was suggested that glucose was injurious to health when employed as a food, this contention was subsequently abandoned, and it was admitted by the prosecution that this view could not be maintained. The Horsham Bench, in giving judgment, stated that they did not consider the added article prejudicial to health.”

Referring to the advantages to be derived by the use of glucose in jellies, etc.:

Pages 5-6.—“By the addition of glucose, marmalade can be made with less water, it is more viscid and palatable, and does not become hard. From 10 to 20 per cent. of glucose is the right proportion and this quantity effectually prevents candying.

When marmalade is prepared with cane sugar only, it is stiff in consistence, and after being kept for a time, undergoes crystallization forming a hard, indigestible mass, to which the consumer naturally objects. To remedy this defect, some manufacturers add apple and other fruit jellies to render it less consistent and gritty, and to give it the requisite softness. The same object is attained by the addition of small quantities of tartaric acid or phosphoric acid before boiling down, so as to convert the cane sugar first into invert sugar, that is, into dextrose and levulose, and subsequently into glucose.

It is better to obtain the requisite viscosity by the addition of a suitable percentage of glucose to which it is difficult to see that any objection can be raised.

It will be remembered that glucose or grape sugar is the natural sugar of fruits which do not, as a rule, contain cane sugar.”

GLUCOSE IN BEER. “One of the nicest and cleanest tasting pale ales which I am acquainted with, contains a considerable quantity of glucose, and is a wholesome and refreshing drink.”

“There has been much talk of late about ‘Pure Beer,’ but as a matter of fact the public do not care for and will not drink a beer prepared from malt and hops alone, and want something lighter and more palatable. As long as they are supplied with a beer which is perfectly wholesome they cannot be said to be ‘prejudiced’ even in the technical sense of the word, and the consumer has a perfect right to demand and obtain the product which pleases his taste and suits his requirements.”

Pages 8-9.—“The mother liquors from the various crystallizations are sold as treacle or molasses and contain the sugars which do not crystallize together with the saccharine constituents of the juice. Cane sugar is often tinted with ultramarine to neutralize the yellow of the imperfectly purified

article, so that cane sugar is just as much a manufactured article as is glucose."

"Commercial glucose contains nothing injurious. I have searched through most of the work on toxicology and can find no case of poisoning by glucose. I do not believe that such cases exist."

"Commercial glucose is not only a food, but a most excellent food. Two of its constituents, maltose and dextrose, are sugars, and are of the greatest possible value in the animal economy. The third constituent, dextrin, is half way between starch and sugar, and as soon as it comes in contact with the saliva and the secretions of the pancreas and intestine, is converted into sugar."

"From this it follows that not only is glucose a good food, but that it is a valuable nutritious agent comprising all of the best qualities of the carbohydrates."

Page 10.—"Apart from the physiological consideration, we have clinical proof that glucose is a good food. Dextrin is the active ingredient of some of the most popular children's and invalids' foods, which are constantly prescribed in all kinds of acute illnesses, when other forms of nourishment, with the exception of milk, perhaps, are contra-indicated. Maltose and dextrose are admittedly good foods, and dextrine is the third important ingredient of commercial glucose."

"For wasting children, glucose is an excellent food, and they rapidly improve in condition and grow fat on it."

"It is difficult to see what objection can be urged against the employment of glucose in the manufacture of jam and marmalade."

"Glucose is just as nutritious and as easily digested as cane sugar; it is every bit as good a food."

"One large firm of jam manufacturers, who have used glucose only during the last seven years, state that prior to that time their business had fallen off, but since then it has notably increased. If jam were required for immediate consumption only, the old-fashioned methods would suffice, but now that they are exported to all parts of the world, and often not consumed for three or four years, during which they are subjected to many changes of temperature, the addition of glucose is imperative. There is reason to think that, with one exception, all the large jam manufacturers now employ glucose in addition to cane or beet sugar. It is said to be impossible to make whole fruit jam without glucose. One maker who states that he makes a whole fruit jam without glucose probably uses small and very acid strawberries, the acid of which converts the cane sugar into invert sugar."

"To sum up, it may be safely affirmed that there is no valid objection to the use of glucose as a substitute for cane sugar, or beet sugar in jams, marmalade, confectionery, or beer, and that prosecutions for employing it for this purpose are vexatious and serve no useful purpose, but, on the contrary, are prejudicial both to the consumer and the maker, inasmuch as they tend to restrict the production of the best and most palatable form of article of everyday consumption."

The following opinion of Mr. B. E. R. Newlands of England, Vice-President of the Society of Chemical Industry, is from *The Grocer*, March 2, 1901, p. 632:

"Glucose was made from corn flour. That was a pure made starch sold in this country as corn flour. It was a perfectly made wholesome material."

Opinion of Mr. John Goodfellow, Professor of Physiology and Hygiene at the East London Technical College, in *The Grocer*, March 2, 1901, p. 632-633.

"He said seriously that glucose was more nutritious than cane sugar, weight for weight; the public was better off with it, apart from any question of keeping. He had examined the glucose used in jam factories for many years, and he never had a sample which he could conscientiously say contained a deleterious substance."

From *The Journal of the English Patent Office*:

"These properties make glucose highly valuable for confectionery purposes."

In the *New York Commercial* of February 8, 1901, page 16, Prof. Chas. F. Chandler says:

"In my address at the Royal Institute in London last year (1900) I was glad of the opportunity to speak of the beginning and marvellous growth of the glucose industry of America as an example of the great practical value of industrial chemistry. I have made a close study of the glucose industry for some years, following the product from the fields of maize to the consumer."

"Sometime ago the Government commissioned me to make a report on the process of manufacture of glucose and grape sugar. I visited a great many glucose works and studied every phase of the processes, from the corn to the starch, and then to the liquid product—glucose, and the solid product—grape sugar. My report was accepted and published by the Government as an official document. I found that the products were free from deleterious substances and were wholesome in the highest degree."

"There is nothing objectionable used in the making of glucose and grape sugar, and nothing objectionable is developed in the processes of manufacture. So the public need not entertain any fears about deleterious ingredients contained in glucose or beer made by reliable makers."

"It is true that there have been at times in the public press questions as to the wholesomeness of glucose; but in no instance by anyone qualified to understandingly speak of it. It must be borne in mind that glucose, being an article of great value as an article of food, by reason of its special qualities of excellence is to a greater or less extent displacing other syrups and sugars, and consequently, creating more or less trade hostility, which finds expression in unwarranted charges and complaints."

In the *Quarterly Bulletin* of the Florida Agricultural Department, Vol. 21, No. 2, dated April 1st, 1911, on page 75, we find the following statement under the heading *What Good Syrup Is*. This is part of an article on "Sugar Production in Florida," by R. E. Rose, State Chemist, Tallahassee, Fla.

"In making syrup (good syrup), the object is to produce a thick, clear build, that will not granulate or 'sugar off.' It may be startling to a number of my auditors when I assert that first class syrup contains but comparatively

little sugar. A first class syrup, be it made from cane, maple sap, corn, rice, potatoes, beets, watermelons, or other vegetable substance, is but a solution of glucose or 'invert' sugar, with no appreciable quantity of sucrose or sugar; hence to make a good, thick, heavy, clear syrup, we proceed to change our sugar to glucose or 'invert' sugar, exactly opposite to the desire of the sugar maker. The sugar maker seeks to prevent the 'inversion' of his sugar to glucose, and to get his sugar to the 'grain' as quickly as possible; he desires as little glucose as possible, and separates the molasses and glucose from his crystals as rapidly as possible."

In *Pure Foods*, Their Adulteration, Nutritive Value and Cost, By John C. Olsen, A.M., Ph. D., Professor of Analytical Chemistry at the Polytechnic Institute of Brooklyn, N. Y., is found on page 97.

"The assumption that glucose is unwholesome or injurious or even of little or no food value is absolutely erroneous. On the contrary it is highly nutritious food, having an energy value of 1,777 calories per pound, and is very readily digested and assimilated. It is inferior to cane sugar only in the matter of flavor."

Collier's Weekly, May 11, 1912. Editorial comment:

TERMINOLOGY.

Experts disagree, inevitably and honestly, about some cases near the border lines. In the pure-food controversy we have been asked to supplement, with our own editorial opinion, the conflicting views given by different writers in our columns about glucose and corn syrup; and we are entirely willing to do so. Pure-food explanation is now, has been, and will continue to be a large part of our work; and we always prefer, when it is possible, the positive to the destructive side. We believe, then, that public prejudice against the word glucose is intense and unreasonable, probably because it sounds like glue; that glucose is harmless; that corn syrup is a justifiable designation for the product in dispute, since it has long borne the name, is made from corn starch, and does not pretend to be what it is not, there being in the market no other syrup made from corn.

National Food Magazine, June, 1912:

CORN SYRUP AND GLUCOSE.

An editorial in *Colliers'* of May 11, on Corn Syrup, very pertinently expressed the right sentiment in these words:

"We believe, then, that public prejudice against the word glucose is intense and unreasonable, probably because it sounds like glue; that glucose is harmless; that corn syrup is a justifiable designation for the product in dispute, since it has long borne the name, is made from corn starch and does not pretend to be what it is not, there being in the market no other syrup made from corn."

Colliers' is to be congratulated for seeing the light in this controversy at last, and we really believe that all fair minded publications, as well as food officers, will reach the same conclusions when they have well weighed all the facts in the case. From the first this magazine protested against

such an unjust traducement of a wholesome product and insisted that it should be permitted to wear the name "corn syrup."

Forecast Magazine, America's Pure Food Champion. "From Corn to Candy," by Mrs. Winifred Harper Cooley, National President of the Associated Clubs of Domestic Science:

"It is bottled sunshine, this glucose, and seems quite fit for any form of candy. . . .

"We feel that we have beheld a wonderful chemical transformation. How is this tiny grain of corn changed into this sticky sweetness? What is nature's alchemy that changes the fragile flower into honey, and the little hard kernel of corn into candy? . . .

"Chocolate creams have a delicious waxy consistency, when the filling is made of glucose, and its "keeping" properties are great."

It is the earnest wish of the management that every facility be accorded to those desiring to learn more of this interesting industry.

We shall be pleased to furnish to any educational institution sets of samples and literature illustrating the products made from Corn.

Our factories are always open for inspection.

We are making Pure Food Products and are anxious that every one shall be satisfied as to this fact.

EDUCATIONAL BUREAU,
CORN PRODUCTS REFINING COMPANY.

17 Battery Place,
New York City.

